Personality Certainty:
Increasing the Predictive Utility of Personality Inventories

DISSERTATION

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Abstract

Previous research on personality has identified a number of variables that influence the predictive utility of personality scales. Research on attitude strength, however, points to at least one potentially important factor that has been heretofore overlooked: the certainty with which people make their responses. The present research establishes that the certainty with which people respond to personality scales is associated with stability of the personality scale responses over time and correspondence between the scale and related judgments and behaviors. In addition, the effects of certainty hold when controlling for a number of previously established personality to behavior moderators. This research suggests that measuring certainty in answers to personality scales might be a particularly useful and efficient way to increase the predictive utility of personality scales. This is demonstrated with need for cognition (Study 1), self-monitoring (Study 2), political ideology (Study 3), and openness to experience (Study 4) using college student samples.
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Chapter 1: Introduction

Personality inventories are used in a variety of settings: clinical, scientific research, and among human resources professionals. Because personality inventories might be used as inputs into decisions as important as diagnosing a mental health disorder or making a job offer, the predictive utility of such measures is crucial. The most commonly used personality inventories rely on people’s self-reports of their dispositions. However, as early as 1931, Newcomb noted that in many situations, the correspondence between self-reports of personality and personality-relevant behavior is surprisingly low, prompting a debate over the validity of such measurements (e.g., Endler & Magnusson, 1976; Mischel, 1968).

In the wake of the debate, contemporary research suggests that one possible approach is to abandon the issue of whether personality scales predict behavior and to determine when and for whom these assessments are predictive. Indeed, researchers have examined moderators of personality effects on behavior. Such moderators include the accessibility of participants’ responses to personality scales (e.g., Holden, Fekken, & Cotton, 1991; Mellema & Bassili, 1995; Neubauer & Malle, 1997; Siem, 1996), the variability of an individual’s responses to the scale (e.g., Baumeister, 1991; Baumeister & Tice, 1988; Bem & Allen, 1974), self-reports about the personal importance or self-relevance of the trait assessed by the scale (e.g., Cheek, 1982; Markus, 1977; Zuckerman,
Bernieri, Koestner, & Rosenthal, 1989; Zuckerman, Koestner, DeBoy, Garcia, Maresca, & Sartoris, 1988), the degree to which people perceive that their behavior with regards to the assessed trait is stable across time or consistent with the scale (e.g., Bem & Allen, 1974; Cheek, 1982; Kenrick and Stringfield, 1980; Zuckerman, et al., 1988, 1989), and the degree to which people characterize their trait-relevant behavior as being publicly observable (e.g., Cheek, 1982; Kenrick and Stringfield, 1980; Zuckerman, et al., 1988, 1989). A second approach involves measuring personality traits that involve self-presentation or social concern, such as self-monitoring (Snyder, 1974) or self-consciousness (Fenigstein, Scheier, & Buss, 1975) to better identify for whom personality scales are most valid (see e.g., Cheek, 1982; Mills and Hogan, 1978; Scheier, Buss, & Buss, 1978; Tunnell, 1980; Underwood & Moore, 1981).

**Attitude Certainty**

In the present research, an approach is imported that has proven useful in the literature on attitudes, where researchers have also abandoned the question of *whether* attitudes predict behavior and turned to the *when* and *for whom* questions (e.g., Fazio, 1995). In particular, researchers have argued that attitudes can be weak or strong (Petty & Krosnick, 1995), and the strength of an attitude has implications for whether it is stable over time, resistant to change, and most importantly, predicts behavior (Krosnick & Petty, 1995). Although there are many properties of an attitude that are associated with its strength, the focus here is on one variable that has proven particularly useful – attitude certainty. Attitudes held with high certainty demonstrate strength consequences more than attitudes held with low certainty (see Petty, Briñol, Tormala, & Wegener, 2007;
The purpose of this research is to test the idea, parallel to research on certainty in attitude scales, that certainty in personality inventory responses can enhance their usefulness in predicting behavior.

People can be certain of their attitudes for many reasons. For example, certainty is influenced by perceptions of how much one has thought about the attitude object (Barden & Petty, 2008), how quickly the attitude comes to mind (Holland, Verplanken, & van Knippenberg, 2003; Petrocelli, Tormala, & Rucker, 2007), the ease of generating attitude-consistent information (Haddock, Rothman, Reber, & Schwarz, 1999), the perceived stability of the attitude over time (Petrocelli, Clarkson, Tormala, & Hendrix, 2010), and so forth. In addition, certainty is often moderately correlated with, but distinct from, a number of other attitude strength indicators like extremity, actual amount of knowledge, perceived knowledge, importance, and accessibility (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993; Krosnick & Petty, 1995). Notably, research to date indicates that regardless of the basis of the certainty, it is consequential in enhancing attitude-behavior correspondence (e.g., Barden & Petty, 2008; Petrocelli et al., 2007). Thus, attitude certainty serves as an omnibus variable that stems from many sources.

The goal of the current research is to determine if people’s certainty in their answers to personality measures is as important as people’s certainty in their attitude reports (see also DeMarree, Petty, & Briñol, 2007). As with attitudes, people can be certain in their answers to personality inventories for a variety of reasons. Some of these reasons include moderators that prior researchers have used to increase trait-behavior
correspondence (e.g., trait importance). Research on attitude certainty suggests other bases for certainty (e.g., how much people have thought about the trait). Thus, certainty in personality responses could serve as a convenient summary indicator of a wide range of antecedents of “personality strength” just as it does in the attitude strength literature.

**Existing Research on Personality Certainty**

Past research suggests that examining personality certainty may have utility. Most notably, although Swann and Ely (1984) did not use a validated personality inventory, they found that people’s self-reports of the extent to which they had the trait of extraversion on several bi-polar rating scales were more predictive of their behavior when they were certain of those ratings. In addition, participants who were certain in their ratings were less influenced by leading questions asked by interviewers regarding their extraversion. Similarly, Pelham and Swann (1994; Pelham, 1991) have found that assessments of perceived ability (e.g., self-ratings of intelligence) of which participants are most certain are more stable and better predict other people’s ratings of the target on the same dimensions than the abilities about which participants are least certain. Thus, when people are directly asked about a perceived ability, specific trait or attitude, increased certainty in these judgments increases prediction of behavior.

**Present Research**

In the present research, certainty in individuals’ responses to personality inventories is examined. Unlike the work described above, personality inventories are often designed to measure a stable disposition without directly asking the person about that disposition. That is, dispositions are inferred from the overall pattern of responses to
the various items on the individual difference measure rather than assuming that people necessarily have a self-schema about the relevant personality dimension. It remains an open question as to whether assessing certainty would have the same degree of impact as when people are asked directly about a specific trait or ability. Certainty might not have as much utility when participants’ responses only indirectly relate to self-characteristics compared to when the constructs are explicitly identified (e.g., attitudes, traits).

Furthermore, psychometrically validated multi-response personality inventories may already have maximized predictive utility and therefore might not benefit much, if at all, from the measurement of certainty compared to the one-item responses that are sometimes used to assess traits abilities, and attitudes. In contrast to these possibilities, the present research examines whether taking into account a person’s certainty regarding responses to personality inventories can enhance both the stability of personality scale responses as well as the utility of scale responses in predicting relevant behaviors. In doing so, this research offers several important advances. First, this is the first research to examine the certainty of individuals’ responses to well-validated personality inventories. Personality inventories are important because they are among the most common instruments employed in psychological research as well as in applied domains such as counseling and human resources.

Second, this research also examines whether certainty in personality inventory responses predicts the stability of these responses over time (Study 1). This is important because professionals who use personality inventories are often interested in predicting
future behavior, and having a tool to predict the stability of participants’ response over time is extremely important in aiding this goal.

Third, in addition to assessing whether certainty predicts stability in personality inventories, the stability of certainty in personality scale responses itself is examined (Study 1). To the extent that certainty measures are assessing a relatively stable construct, certainty responses at one time will be more useful in predicting relevant future outcomes.

Fourth, this research compares personality certainty to a number of previously established moderators of the effects of personality inventories on behavior (Studies 3 and 4). Certainty could be particularly useful because certainty is a judgment people make about a primary judgment (in this case, the primary judgments are about the personality items). Because many of the other moderators might influence judgments of certainty, measuring certainty would capture and aggregate these different inputs. If all of these moderators influence certainty, then it may be more efficient to simply measure certainty, rather than a large number of moderators. It is also useful to assess whether certainty is useful above and beyond previously examined moderators.

In sum, the goal of this research is to examine certainty as a moderator of personality effects. To that end, four studies were conducted, using a variety of personality inventories and behavioral outcomes. The goal of Study 1 was to examine whether certainty predicts the stability of a personality inventory over time, as well as to examine the stability of the personality certainty construct itself. In Study 2, it was determined whether certainty would predict personality-behavior correspondence. In
Studies 3 and 4, certainty was compared to other established moderators of personality-behavior correspondence. In Study 3, the moderators were specific to the personality variable. In Study 4, the moderators were ones that have been used with a variety of personality variables. Across studies, it was expected that as participants’ certainty in their answers to the personality inventories increased, so would the stability of their responses and correspondence of these responses with their behavior.
Chapter 2: Study 1

The goal of this study was to examine whether a personality trait is more stable over time when held with high certainty. Stability is one of the hallmarks of strong attitudes (Krosnick & Petty, 1995), and demonstrating that personality certainty predicts stability of responses to a personality inventory over time will provide initial evidence that personality certainty has important consequences. In addition, Study 1 also aimed to determine whether judgments of personality certainty are themselves stable over time. The more stable personality certainty is, the more likely it should be to serve as a moderator of personality-behavior consistency over time.

In this study, certainty in individuals’ responses to the need for cognition (NFC) inventory (Cacioppo & Petty, 1982; Cacioppo, Petty, & Kao, 1984) was investigated. The NFC inventory assesses individual differences in the enjoyment of and tendency to engage in thought. People high (versus low) in NFC like to think and deliberate. The inventory has been shown to predict a wide variety of behaviors related to information processing (see Cacioppo, Petty, Feinstein, & Jarvis, 1996; Petty, Briñol, Loersch, & McCaslin, 2009; for reviews). Participants completed the 18-item NFC inventory and associated certainty at two time-points, one-week apart. The expected results were that both NFC and certainty in NFC responses would be stable over time and that certainty in initial responses to the NFC inventory would predict stability of NFC scale responses.
Method

Participants. Two-hundred and four introductory psychology students participated in partial fulfillment of a course requirement. Of these 204 participants, sixty-four returned to the lab for the second session and served as the study sample.

Procedure. The two sessions were identical: participants completed the NFC inventory in each (Cacioppo et al., 1984). After every third item, participants indicated their certainty in the previous items. In the second session, participants completed these measures after completing unrelated tasks. Finally, participants were thanked for participating and debriefed.

Measures.

Need for cognition. Participants responded to the 18-item NFC inventory (Cacioppo et al., 1984) on a 5-point response scale (1 = extremely uncharacteristic, 5 = extremely characteristic). Items include “I prefer complex to simple problems,” and “Thinking is not my idea of fun” (reverse coded). Higher scores indicate higher NFC. Responses at each time were averaged to form an index of NFC (α = 0.89 at Time 1 and 0.91 at Time 2). Scores ranged from 1.83 to 4.78 with a mean of 3.53 (SD = 0.67) at Time 1 and 3.46 (SD = 0.72) at Time 2 (see Appendix A).

Need for cognition certainty. After every third NFC item, participants indicated how certain they were in the preceding answers using a 5-point scale (1 = extremely uncertain, 5 = extremely certain). Responses at each time were averaged to form an index of NFC certainty (α = 0.86 at Time 1 and 0.89 at Time 2). Scores ranged from 2.83
to 5 with a mean of 4.33 ($SD = 0.59$) at Time 1 and 4.43 ($SD = 0.56$) at Time 2 (see Appendix A).

Results

Analysis of NFC Stability. Prior to analysis, all predictor variables in this and all other studies were centered by subtracting the sample mean to aid in interpretation (Aiken & West, 1991). To determine whether NFC stability was moderated by initial NFC certainty, Time Two (T2) NFC was submitted to a Time One (T1) NFC × T1 NFC Certainty regression analysis. There was a main effect of T1 NFC ($B = 0.95, SE = 0.07$), $t(61) = 13.37, p < 0.01$, such that participants who reported higher NFC at T1 had higher NFC at T2. The predicted interaction of NFC and NFC certainty also emerged, though it was marginal in statistical significance ($B = 0.22, SE = 0.13$), $t(60) = 1.69, p = 0.10$. There was not a main effect of T1 NFC certainty on T2 NFC ($t < 1.0$). A decomposition one standard deviation above and below the mean of NFC suggested that stability was greater at high ($B = 1.02, SE = 0.08$), $t(60) = 12.47, p < 0.01$ versus low NFC certainty ($B = 0.76, SE = 0.13$), $t(60) = 5.71, p < 0.01$.²

One possible alternative explanation is that NFC and NFC certainty are simply highly correlated, and this caused the greater correspondence between NFC measurements at high certainty. Indeed, NFC and NFC certainty are correlated, albeit modestly, with one another at both measurement periods ($r = 0.45, p < 0.01$ at T1; $r = 0.36, p < 0.01$ at T2). If this were the case, however, one might expect that T2 NFC certainty could be predicted by T1 NFC and NFC certainty. Thus, NFC certainty was analyzed next.
Analysis of NFC Certainty. The scores on T2 NFC certainty were submitted to the same analysis conducted on the T2 NFC score. That is, the analysis conducted was a T1 NFC × T1 NFC Certainty regression analysis with T2 NFC certainty as the dependent measure. There was only a main effect of T1 certainty ($B = 0.76$, $SE = 0.09$), $t(61) = 8.64$, $p < 0.01$, showing that just as NFC scores were stable over time, so too was NFC certainty. The correlation between T1 and T2 NFC certainty was strong ($r = 0.77$). Critically, the interaction of NFC and NFC Certainty was not significant, ($B = -0.09$, $SE = 0.15$), $t(60) = -0.61$, $ns$, nor was the main effect of T1 NFC on T2 NFC certainty ($t < 1.0$). In sum, although initial NFC certainty influenced the stability of NFC scores as hypothesized (see above), initial NFC did not moderate the stability of NFC certainty.

Discussion

Study 1 supported the hypothesis that NFC would be more stable over time as certainty in responses to the NFC inventory increased. There was greater correspondence between T1 and T2 NFC scores when people were highly certain. Furthermore, the relationship between NFC and NFC certainty could not account for this effect.

That certainty has multiple antecedents is one reason certainty can be such a useful moderator of personality effects, but it is also a potential drawback if there is variability over time in the levels of these antecedents or in the antecedents individuals rely on cause reports of certainty. However, in this study, certainty was fairly stable over time. This suggests that researchers could measure certainty and expect it to increase the predictive validity of a personality inventory even when the behavior of interest occurs at least several days later. Indeed, some research suggests that temporal stability of
personality is associated with greater self-other agreement, a commonly used dependent variable in personality research (e.g., Biesanz & West, 2000; Biesanz, West, & Graziano, 1998).
Chapter 3: Study 2

The purpose of Study 2 was to investigate whether a personality inventory would predict personality-relevant behavior to a greater extent when people were certain of their scale responses. In this study, a different popular and highly researched personality variable was used: self-monitoring. Self-monitoring assesses individual differences in attending to social versus internal cues that impact behavior. High self-monitors pay attention to and rely on the social situation in guiding behavior, whereas the behavior of low self-monitors is driven by their own beliefs and values (DeMarree, Wheeler, & Petty, 2005; Snyder, 1974, 1979).

High self-monitors are more persuaded by advertisements that emphasize a favorable social image, whereas low self-monitors are more persuaded by messages that emphasize favorable utilitarian features of the product (e.g., Snyder & DeBono, 1985). This emphasis is evident even in the advertisements that high and low self-monitors create for themselves (Shavitt, Lowrey, & Han, 1992), a finding that forms the basis for the current study. In Study 2, participants designed advertisements for an athletic shoe and completed measures of self-monitoring and self-monitoring certainty. It was expected that as participants’ level of self-monitoring increased, so too would their tendency to emphasize social image in their advertisements, replicating past research.
Critically and uniquely, this relationship was expected to strengthen as certainty in participants’ self-monitoring scale responses increased.

Method

Participants. Participants were 105 introductory psychology students whose participation partially fulfilled a course requirement.

Procedure. Participants were told that the study involved responses to advertising. Following the procedure established by Shavitt et al. (1992), participants were asked to write an advertisement for a new product. After writing their ad, participants rated them for image versus quality content. Then participants completed the 18-item self-monitoring inventory followed by the certainty measure. Finally, participants were thanked for their participation, debriefed, and dismissed.

Predictor Variables

Self-monitoring. Participants completed the 18-item self-monitoring inventory (Snyder & Gangestad, 1986) by responding to true or false statements like “I would probably make a good actor” and “I find it hard to imitate the behavior of other people” (reverse coded). The inventory was scored such that higher ratings indicated higher self-monitoring (α = 0.59). Scores ranged from 2 to 15 with a mean of 9.43 (SD = 2.99; see Appendix B for full scale).

Self-monitoring certainty. Self-monitoring certainty was assessed with three questions immediately following the self-monitoring inventory. Participants were asked how confident they were in their responses, how certain they were that their answers accurately described them, and how confident they were that their answers were accurate.
Responses were given on a 5-point scale (1 = not at all certain/confident; 5 = extremely certain/confident) and were averaged to form an index of self-monitoring certainty (α = 0.93). Scores ranged from 1.67 to 5 with a mean of 4.17 (SD = 0.71; see Appendix B).

**Dependent Variable: Self-Ratings of Argument Theme**

Participants wrote advertisements for a novel tennis shoe. This product was chosen because athletic shoes can serve social as well as utilitarian functions (Shavitt et al., 1992). Participants were shown a picture of a shoe labeled “Sport brand athletic shoe” and informed that they could make any reasonable assumptions about the product in writing an ad that would attract them to buy the product. Participants had 4-minutes to write their ads, after which they rated the theme of their advertisement: from completely social (1) to completely utilitarian (7). “Completely social” was defined as “focusing on the image associated with the product, such as its popularity,” and “completely utilitarian” was defined as “dealing completely with the quality of the product.” Lower numbers indicate ads that emphasized image over quality information (see Appendix B for full instructions and ratings).

**Results**

Self-ratings of argument theme were submitted to a Self-Monitoring × Self-Monitoring Certainty multiple regression analysis. There was a marginally significant main effect of self-monitoring (B = -0.10, SE = 0.06), t(102) = -1.68, p = 0.10, that was moderated by the predicted interaction of self-monitoring and self-monitoring certainty (B = -0.17, SE = 0.09), t(101) = -2.00, p = 0.05. Among participants high in self-monitoring certainty, self-monitoring influenced the type of ads generated with high self-
monitors generating more image-focused ads \((B = -0.20, SE = 0.08), t(101) = -2.61, p = 0.01\). This effect was not found among participants low in certainty, \((B = 0.05, SE = 0.09), t(101) = 0.51 \text{ ns (see Figure 1).}\)

Three independent coders also rated the overall theme of each of the ads, using a 9-point scale similar to the one used by participants \((\alpha = .86)\). The average of these ratings showed a similar pattern of results; reproducing the main effect of self-monitoring \((B = -0.12, SE = 0.06), t(102) = -1.92, p = 0.06\), and the interaction between certainty and self-monitoring \((B = -0.16, SE = 0.10), t(101) = -1.66, p = 0.10\). There was only a significant effect of self-monitoring among those high \((B = -0.22, SE = 0.09), t(101) = -2.55, p = 0.01\), but not low in certainty, \((B = -0.01, SE = 0.10), t(101) = 0.09, \text{ ns.}\)

**Discussion**

The results of Study 2 show that people with higher scores on the self-monitoring inventory created more socially-focused ads, but this relationship was stronger when certainty in the self-monitoring inventory was higher. Thus, whereas Study 1 showed that personality certainty predicts the stability of a personality variable, the current study indicates that personality certainty is also useful in predicting behavior, which, of course, is the ultimate goal of using personality inventories.
Figure 1. Results of Study 2: Self-rated theme of participant-generated ads predicted by self-monitoring and certainty at $\pm 1$ standard deviation of self-monitoring and certainty. 1 = completely social; 7 = completely utilitarian.
Chapter 4: Study 3

As mentioned in Chapter 1, although certainty is a potentially important but overlooked moderator of personality effects, it is not the only moderator of personality effects. Thus, the main goal of the third study is to examine the predictive power of certainty relative to other moderators. The personality variable used in this study is a widely used individual difference: political ideology, specifically liberalism-conservatism. Liberalism is characterized by seeking change to society and elimination of social inequality, whereas conservatism is characterized by preventing change, preserving tradition, and tolerating inequality (e.g., Jost, Federico, & Napier, 2009). Consequently, conservatism tends to correspond to such personality orientations as being low in openness to experience (e.g., Butler, 2000; Onraet, Van Hiel, Roets, & Cronelis, 2011; van Hiel, Kossowska & Mervielde, 2000; Trapnell, 1994), high in right wing authoritarianism (e.g., Altemeyer, 1981; Butler, 2000; Onraet et al., 2011; Whitley & Lee, 2000), social dominance orientation (e.g., Pratto, Sidanius, Stallworth, & Malle, 1994; Whitley & Lee, 2000), dogmatism (e.g., Rokeach, 1960; Smithers & Lobley, 1978; Whitley & Lee, 2000), and need for closure (e.g., Chirumbolo, 2002; Kemmelmeier, 1997; Onraet et al., 2011). Self-reported ideological identification has been shown to predict voting behavior (e.g., Holm & Robinson, 1978; Jost, 2006; Knight, 1985; Levitin & Miller, 1979; Miller, Miller, Raine & Brown, 1976; Sears, Lau, Tyler, & Allen, 1980;
Stimson, 1975) and political attitudes (e.g., Feldman, 1988; Glaser, 2005; Jacoby, 1991; Knight, 1985; Lau & Heldman, 2009; Levitin & Miller, 1979; Miller et al., 1976; Sears et al., 1980; Sears, Hensler, & Speer, 1979; Stimson, 1975), although the usefulness and existence of stable ideology, has been questioned (e.g., Converse, 1964). As in the attitudes and the personality domains, moderators are likely to exist that suggest when and for whom ideological identification is a better predictor of behavior. Certainty is likely to be one moderator and prior research has examined others that are specific to ideology.

For example, Holm & Robinson (1978) and Stimson (1975) found that ideological identification predicted voting behavior better among people with greater ideological awareness (i.e., political knowledge). Researchers have also found that education level increases ideology-behavior correspondence (e.g., Jacoby, 1991; Sears et al., 1979; Stimson, 1975) as does level of political sophistication (e.g., Knight, 1985; Jacoby, 1991; Sears et al., 1980). Participants’ ideology should also predict their attitudes better to the extent that they are involved with politics (e.g., Converse, 1964).

In this study, political ideology was used to predict relevant political attitudes by adapting items from the American National Election Studies (ANES) 1990s question file related to classic conservative and liberal issues such as civil rights, abortion, prayer in school, and spending for the military, among others. A number of potential moderators that are particularly relevant to political ideology, such as knowledge, interest, and involvement in politics were used.
It was expected that political attitudes would become more conservative as self-reported conservatism increased, and that this relationship would increase to the extent that participants were certain in their ideology. The same was expected for the other moderators. Uniquely, it was also hypothesized that certainty should show at least as strong of a moderating role as the other moderators, if not stronger, because it is a metacognition that is likely to be based at least in part on the other moderators.

Method

Participants. One-hundred and fifty undergraduates participated in this study in partial fulfillment of a research requirement for their introductory psychology course. Ninety-six participants completed the survey online on their own time outside the lab; fifty-four participants completed the same survey in the lab. The only difference between the groups was the location in which they participated.

Procedure. Participants were told that the researchers were interested in political beliefs and actions. First, participants indicated their ideology and their certainty in their ideology. They completed the panel of moderator questions (described shortly). Next, they indicated their attitudes to a variety of policy issues. Finally participants were debriefed.

Predictor variables

Ideological identification. A single item measure of ideology based on the ANES questionnaire was used in this experiment (see also, Jost, 2006). Although some have raised the question of whether liberalism and conservatism should be treated as a bipolar scale (e.g., Conover & Feldman, 1981; Kerlinger, 1984), this single-item measure
has proven useful in prior research (e.g., Jost, 2006; Jost, Glaser, Kruglanski, & Sulloway, 2003). Participants indicated their position on a 7-point scale of ideology with responses ranging from extremely liberal (1) to extremely conservative (7), with the middle position labeled moderate. Thus, higher scores indicate greater conservatism (range 1-7, $M = 4.05$, $SD = 1.60$; see Appendix C).

**Ideology certainty.** Following the ideology measure, participants indicated their confidence in their answers to the scale. Participants were asked how certain and confident they were in their self-reported ideology. The two items were correlated ($r = 0.59$) and combined into a certainty index (range 1-5, $M = 3.78$, $SD = 1.00$; see Appendix C).

**Political interest.** Participants were asked five questions about their interest in politics (see Judd, Krosnick, & Milburn, 1981; Nie, Verba, & Petrocik, 1976). Specifically, the questions asked them how interested they were in the 2012 presidential campaign (1= extremely disinterested; 6 = extremely interested), how much they had been watching debates (1 = none; 5 = all), how much they think about the election, how much they watched news programs for political information, and how much they read articles for political information (for latter 3: 1 = never; 7 = multiple times per day). Responses were standardized and averaged so that higher scores indicate greater interest ($\alpha = 0.86$; see Appendix C).

**Political involvement.** Five questions were used to assess political involvement, which were modified from prior research (e.g., Judd et al., 1981; Nie et al., 1976). Participants were asked how often they had tried to persuade someone to their political
orientation, how many political petitions they had signed, how often they had contacted a
ewspaper or politician about a political issue, how often they shared articles about
political issues with others, and how often they made political comments on articles on
websites or social networking sites. Responses ranged from never (1) to every day (6) or
multiple times per day (7). The multiple times per day response option was only used
where sensible (e.g., sharing articles and commenting on websites). Responses were
averaged so that higher scores indicate greater involvement ($\alpha = 0.73$, range 1-4.4, $M =
1.84$, $SD = 0.76$; see Appendix C).

**Political knowledge.** Political knowledge was assessed in two ways: First,
participants were asked a single question about how knowledgeable they thought they
were about politics (1 = not at all knowledgeable; 5 = extremely knowledgeable; range 1-
5, $M = 2.56$, $SD = 0.98$). Participants were also asked a variety of questions about current
state and national politicians (e.g., president, cabinet, congress, supreme court, etc.) and
their political parties, where relevant. Participants got a point for each correct answer
(range 1-74, $M = 9.01$, $SD = 9.33$). See Appendix C for the full item wordings. There
were three participants whose scores were greater than 3 standard deviations above the
mean of knowledge. They are included in the analyses below, but excluding them does
not change the pattern of results. These two measures were correlated ($r = 0.46$) and for
simplicity were standardized and combined into a single index of knowledge.³

**Dependent Variable: Policy Attitude**

Participants’ policy attitudes were measured by their endorsement of 29 political
and social issues adapted from the 1990s question panel for the ANES. Issues included
military intervention in the Middle East, welfare spending, policies designed to ensure equal rights for minorities and women, defense spending, abortion rights, environmental protection, and socialized healthcare. Responses to these issues were scored so that higher scores indicate more conservative attitudes. Scores on each item could vary from 0 to 100. The conservative responses were coded as 100, the liberal responses as 0, and the coding of intermediate responses was determined based on the number of response options for each item. Participants were also able to select “No opinion” if they did not have an opinion; these responses were not included in this aggregate. The average of the 29 items was calculated to form an index of policy attitudes ($\alpha = 0.61$). Scores ranged from 12.60 to 78.35 with a mean of 42.12 ($SD = 14.85$). See Appendix C for the full text of all 29 questions.

**Results**

**Policy attitudes.** As mentioned in the method, overall the sample was fairly moderate, but slightly more liberal. The average score on the policy attitudes measure was 42.12, which is close to the theoretical midpoint of 50, but slightly more liberal (higher numbers indicate higher conservatism, with hypothetical scores ranging from 0 to 100).

Ideological identification strongly predicted policy attitudes ($B = 8.91, SE = 0.84$), $t(147) = 10.65, p < 0.01$, such that people who identified as being more conservative had more conservative policy attitudes.

**Ideology certainty moderation.** First, to test the primary hypothesis, the index of conservative attitudes was submitted to an Ideology $\times$ Ideology Certainty regression
analysis. There was a main effect of ideology ($B = 8.86, SE = 0.85$), $t(146) = 10.45$, $p < 0.01$, such that the more participants self-identified as conservative, the more conservative their attitudes were. Importantly, the predicted interaction between ideology and ideology certainty emerged ($B = 2.42, SE = 0.93$), $t(145) = 2.61$, $p = 0.01$. There was no main effect of ideology certainty ($t < 1$). A decomposition of this interaction revealed that the effect of ideology was stronger among participants who were more certain ($B = 10.43, SE = 1.03$), $t(145) = 10.15$, $p < 0.01$, than those who were less certain ($B = 5.58, SE = 1.51$), $t(145) = 3.71$, $p < 0.01$ (see Figure 2).

Next, the moderators of ideology based on prior research were examined. These moderators were only modestly correlated with certainty (see Table 1). The same analyses were performed as with certainty by replacing certainty with the other moderators.

**Political interest.** In the analysis involving political interest, there was again a strong main effect of ideology ($B = 8.29, SE = 0.85$), $t(146) = 9.80$, $p < 0.01$ and a main effect of interest ($B = 3.15, SE = 1.12$), $t(146) = 2.81$, $p = 0.01$, such that greater interest was associated with more conservative attitudes. There was also a marginally significant interaction between ideology and interest ($B = 1.93, SE = 1.06$), $t(145) = 1.83$, $p = 0.07$. Decomposition analyses paralleled the analysis for certainty: the effect of ideology was stronger among more interested participants ($B = 9.84, SE = 1.02$), $t(145) = 9.64$, $p < 0.01$, than less interested participants ($B = 6.75, SE = 1.35$), $t(145) = 5.00$, $p < 0.01$.

When both certainty and interest and the interaction of each with ideology were included in the same model, the interaction of ideology and certainty ($B = 2.17, SE =$
0.91), \( t(143) = 2.38, p = 0.02 \), remained significant and the interaction of ideology and interest \( (B = 1.74, SE = 1.05), t(143) = 1.66, p = 0.10 \), remained marginally significant.

**Political involvement.** Political involvement had a main effect on policy attitudes \( (B = 4.15 \ SE = 1.17), t(146) = 3.54, p < 0.01 \), such that greater involvement was associated with more conservative attitudes. There was also the main effect of ideology \( (B = 9.07 \ SE = 0.81), t(146) = 11.24, p < 0.01 \). However, in this analysis, political involvement and ideology did not interact \( (t < 1) \). Unsurprisingly, including certainty and involvement in the same model showed an unchanged interaction between ideology and certainty \( (B = 2.40, SE = 0.90), t(143) = 2.68, p < 0.01 \), and the interaction between ideology and involvement remained nonsignificant \( (t < 1) \).

**Political knowledge.** A regression analysis was conducted using ideology and the index of perceived and actual knowledge as predictors of policy attitudes. There was again a strong main effect of ideology \( (B = 8.59 \ SE = 0.82), t(146) = 10.43, p < 0.01 \) and a main effect of knowledge \( (B = 3.06, SE = 1.06), t(146) = 2.88, p < 0.01 \), such that greater knowledge was associated with more conservative attitudes. In addition there was an interaction between ideology and knowledge \( (B = 3.04, SE = 1.10), t(145) = 2.77, p < 0.01 \). Decomposition analyses revealed that the effect of ideology was stronger among more knowledgeable participants \( (B = 10.68, SE = 1.10), t(145) = 9.68, p < 0.01 \), than among less knowledgeable participants \( (B = 5.49, SE = 1.38), t(145) = 3.97, p < 0.01 \).

As with the other moderators, we also compared knowledge and certainty by including them in the same model. The interaction involving certainty remained
significant ($B = 2.36, SE = 0.89$), $t(143) = 2.65, p < 0.01$, as did the interaction involving knowledge ($B = 3.28, SE = 1.10$), $t(143) = 3.00, p < 0.01$.

**Comparing moderators.** One of the advantages of certainty is that it is likely to be an omnibus variable. In other words, if moderators of political behavior are combined into a single index, certainty should predict above and beyond the combination of the other moderators. To perform this analysis, the other moderators for which we found successful moderation (i.e., political interest and political knowledge) were combined into a single index. There was a main effect of this index on policy attitudes ($B = 3.67, SE = 1.18$), $t(146) = 3.10, p < 0.01$, such that higher scores on the index were associated with more conservative attitudes. The index also interacted with ideology to predict policy attitudes ($B = 2.75, SE = 1.16$), $t(145) = 2.34, p = 0.02$. When this index was included in the same model as certainty, the interaction of certainty and ideology remained significant ($B = 2.19, SD = 0.90$), $t(143) = 2.45, p = 0.02$, and the interaction of this index and ideology remained significant ($B = 2.78, SE = 1.15$, $t(143) = 2.42, p = 0.02$.)

**Discussion**

In Study 3, certainty moderated the effects of a single-item individual difference measure (as in Pelham, 1991; Pelham & Swann, 1994; Swann & Ely, 1984). Specifically, participants’ self-reported ideology predicted their policy attitudes better as certainty increased. Additionally, certainty was compared to a number of previously-used moderators. All of the previously-studied moderators had main effects on policy attitudes, such that more knowledge, involvement, and interest all led to more
conservative attitudes. This is consistent with previous research (e.g., Knight, 1985; Pierce & Hagner, 1982) that self-identified conservatives make up a larger proportion than liberals at high levels of political sophistication.

More pertinent to the primary hypotheses, political interest and political knowledge moderated the effects of ideology on policy attitudes, although political involvement did not. In addition, the effect of certainty remained significant when controlling for each of these other moderators. It was expected that the other moderators would fall to non-significance, because of the metacognitive nature of certainty. However, the interactions involving interest and knowledge both remained significant when certainty was included with each. Additional analyses involving the comparison of indices of the ideology moderators to certainty showed that the interaction involving certainty remained significant when included in the same model as the interaction involving the index of interest, involvement, and knowledge. Further analyses (see Footnote 4) showed that certainty was the only moderator that remained significant when controlling for an index of the other moderators (e.g., involvement controlling for an index of certainty and knowledge), and that when all the moderators and their interactions were analyzed in the same model, certainty and knowledge were the only two variables that moderated the ideology-policy attitudes effect. Taken together, these analyses suggest that certainty affects ideology independently of the other moderators, which are less independent of one another than they are of certainty. In fact interest, involvement, and knowledge are fairly highly correlated with one another (see Table 1). This may indicate that interest, involvement, and knowledge are redundant. These results also
indicate that certainty in this case may have been based on factors in addition to participants’ involvement, interest, or knowledge, like how much they had thought about their ideology, how easily they found it to place themselves on the continuum, etc. Therefore, it would be useful to examine additional variables in future research that are more like attitude strength variables than the moderators studied here (e.g., ideology accessibility). In any case, certainty seems to be a particularly good moderator of ideology effects compared to some other commonly used moderators of ideology effects.

![Figure 2](image.png)

**Figure 2.** Results of Study 3: Policy attitudes as a function of ideological identification and certainty at ±1 standard deviation of ideological identification and certainty. Higher numbers indicate more conservative attitudes.
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*p < .05. **p < .01.

Table 1. Correlations among variables in Study 3
Chapter 5: Study 4

In Studies 2, and 3, it is possible that demand characteristics contributed to the results or that the results were due to processes unrelated to certainty. In Study 2, if participants perceived that the advertisement task was related to how much they generally attend to social cues, they might have used the ads they generated or their ratings of their ads to make inferences about their level of self-monitoring. If their ads were particularly image- or quality-related, this may have increased their use of their ad when answering the questions on the self-monitoring inventory and made them more certain, which is consistent with what was found. In Study 3, the measure of ideological identification and certainty came before the policy attitudes, rather than after, but reminding participants of their ideology before asking them about their policy attitudes may have made them consciously attempt to answer the policy attitudes in an ideology-consistent manner, particularly when they were certain. Therefore, to address these possible concerns, in the fourth study, the personality inventory and a behavior were chosen that were not obviously related to each other. Second, in Study 3, certainty moderated ideology effects when controlling for other ideology moderators, but the moderators used were specific to ideology. Therefore, in Study 4, a goal was to determine if certainty can uniquely predict personality-behavior consistency above previously-examined moderators of personality
effects more generally (i.e., moderators that are not specific to a single personality variable).

In Study 4, a classic personality variable was used, openness to experience, which is one of the “Big Five” factors of personality (e.g., Costa & McCrae, 1992; McCrae & Costa, 1987, 2008). People high in openness are receptive to new ideas and seek novel experiences, whereas people low in openness are conservative and prefer what is familiar (e.g., McCrae, 1987; 1994; 1996).

Because openness is associated with receptiveness to new ideas, it is also associated with susceptibility to a number of judgmental biases, including numerical anchoring. Anchoring effects occur when an irrelevant value (i.e., the anchor) influences responses to a question (e.g., what is the length of the Mississippi river?). Considerable research suggests that people “anchor” on accessible values and fail to sufficiently adjust away from them, which results in lower estimates to the question when lower anchors are provided and higher estimates when higher anchors are provided (e.g., see Jacowitz & Kahneman, 1995; Tversky & Kahneman, 1974); at least when people are not very knowledgeable about the targets (see Wegener, Petty, Blankenship, & Detweiler-Bedell, 2010; Wilson, Houston, Etling, & Brekke, 1996). People high in openness are receptive to new information, and as such, they are more likely to consider an irrelevant anchor when making judgments than are people low in openness (e.g., see McElroy & Dowd, 2007).

The openness-anchoring relationship was selected because participants are unlikely to identify the purposes of the anchoring scale or its relatedness to the openness
to experience items, a critique that could perhaps be made about the other studies. Because of these non-obvious factors, participants are unlikely to have naïve theories about how someone high or low in openness should respond to the anchoring task. Additionally, participants would have to be able to successfully modulate how much the anchor influences their judgment to have their estimates correspond to their openness scores. All of these conditions seem highly unlikely. Indeed, even when participants are explicitly warned beforehand or given incentives to be accurate they are unable to de-bias their anchoring (e.g., Chapman & Johnson, 2002; Tversky & Kahneman, 1974; Wilson et al., 1996).

In addition, certainty was compared to a number of moderators identified in previous research on personality-behavior correspondence to determine whether certainty offered predictive utility above and beyond these established moderators. This is important because if the previously-researched moderators work as well or better than certainty, there will be no additional benefit to measuring certainty. One could simply measure the individual moderators. In addition, the reason that certainty has been selected for study in this research is that it should be a particularly good moderator because of its metacognitive nature; the other moderators are likely to be factors that are considered by people when making judgments of certainty. If this is true, certainty is likely to be modestly related to a number of these other moderators and moderate personality effects even when the other moderators are controlled (as in Study 3).

In sum, in this study, a number of anchoring items were used, and it was anticipated that in accord with prior research, openness to experience would predict
anchoring such that people high in openness would exhibit stronger anchoring effects than people low in openness. Critically, it was hypothesized that this tendency would be strongest as certainty in answers to the openness inventory increased. Furthermore, the question of whether certainty would predict above and beyond previously proposed moderators of personality-behavior consistency was explored.

Method

Participants. One-hundred and seventy-four undergraduates participated in this study in partial fulfillment of a research requirement for their introductory psychology course. However, only 165 participants finished the anchoring dependent measure and are included in the analyses below. The remaining participants completed only some of the materials before leaving the session, despite instructions to continue until the computer instructed them that the session was over.

Procedure. Participants were told that the researchers were pilot testing materials for use in future experiments. The measures of interest were included with a variety of other irrelevant measures. They completed the openness to experience inventory first, along with other personality-type measures. Then, they completed the anchoring measure, which they were told involved a variety of trivia questions. The anchoring task was embedded in a series of short, unrelated questionnaires. Finally participants were debriefed.

Predictor Variables

Openness to experience. A ten-item measure of openness to experience from the International Personality Item Pool (Goldberg et al., 2006) was used. Participants
responded using a 5-point scale indicating how much each statement described them. The statements involved positivity towards the arts and openness to new ideas, as well as avoidance of philosophy and arts and dislike for abstract ideas (these latter items were reverse-scored). An index was created by averaging across questions ($\alpha = 0.67$), and higher numbers indicate higher openness (range 1.7 to 5, $M = 3.55$, $SD = 0.57$). See Appendix D for full question wordings.

**Openness to experience certainty.** Two items were used to measure certainty. These items asked participants how certain and how confident they were in their responses to the openness to experience inventory on a 5-point scale. Responses were averaged ($r = 0.64$). Scores on the index varied from 2 to 5 with a mean of 4.22 ($SD = 0.73$; see Appendix D).

**Openness to experience importance.** The two items used to measure importance were adapted from previous research on moderators of personality variables (e.g., Cheek, 1982; Zuckerman et al., 1988). Participants reported how important and how relevant their responses on the personality inventory were to them on 5-point scales anchored at *extremely unimportant/irrelevant* (1) to *extremely important/relevant* (5). These two items were averaged ($r = 0.65$) to form an index of importance (range 1-5, $M = 3.75$, $SD = 0.78$; see Appendix D).

**Openness to experience perceived stability.** To measure the degree to which participants perceived their behavior to be relatively stable or unstable with regards to the openness to experience inventory, participants reported how much their behavior varied across situations (e.g., Cheek, 1982; Zuckerman et al., 1988). Responses could range
from *not at all varying* (1) to *extremely varying* (5). The scores ranged from 1 to 5 with a mean of 2.88 ($SD = 1.11$; see Appendix D).

*Openness to experience perceived behavioral consistency.* We also asked participants how consistent their behaviors were with the responses on the inventory. Responses could range from *not at all consistent* (1) to *extremely consistent* (5). The scores ranged from 1 to 5 with a mean of 3.98 ($SD = 0.87$; see Appendix D).

*Openness to experience public observability.* As with importance and stability, the public observability measure was taken from previous research (e.g., Cheek, 1982; Zuckerman et al., 1988). Observability was measured with a single item in which participants were asked directly how publicly observable they would say their behavior is with regards to their responses. Responses could range from *not at all observable* (1) to *extremely observable* (5). Scores ranged from 2 to 5 in this sample with a mean of 3.75 ($SD = 0.86$; see Appendix D).

*Openness to experience accessibility.* For each openness to experience item, the amount of time it took participants to respond was recorded in milliseconds. Several indices of accessibility were created using the raw scores. The average raw reaction times varied from 1859 ms to 17,102 ms with a mean of 4699 ($SD = 1859$ ms; see Appendix D).

*Openness to experience interitem variability.* In addition to the self-reported and reaction time moderators, a measure of variability in scores for the openness to experience measure was also computed. This was simply the standard deviation of standardized scores for each participant on the openness to experience inventory (see Appendix D).
Interitem variability ranged from .31 to 1.73 ($M = 0.86$, $SD = 0.29$; see Appendix D).\textsuperscript{6}

**Openness to experience extremity.** An index of the extremity of responses to the openness to experience inventory was created by using the absolute value of the openness to experience score minus the theoretical midpoint. Scores could vary from 0 to 2 ($M = 0.66$, $SD = 0.44$; see Appendix D).\textsuperscript{7}

**Dependent variable**

As the measure of anchoring, participants completed three novel anchored judgment questions embedded within a series of more familiar items (e.g., the population of Chicago). The judgments took the form of a classic paradigm in which participants are first asked whether some measurement is higher or lower than an implausible anchor and are subsequently asked to provide an estimate of the actual measurement (e.g., Jacowitz & Kahneman, 1995; Tversky & Kahneman, 1974; McElroy & Dowd, 2007). The judgments we used were the height of Mt. Everest in feet, the height of the tallest redwood tree in feet, and the percentage of African nations in the UN, all of which had been used in previous research (e.g., Jacowitz & Kahneman, 1995). Responses for the anchoring judgments were standardized and then averaged ($\alpha = 0.42$). See Appendix D for all of the anchoring items.

**Results**

**Certainty moderates the anchoring effect.** To test the primary hypotheses, scores on the anchoring index were submitted to an Anchor (high or low) $\times$ Openness to Experience $\times$ Openness to Experience Certainty regression analysis. First, there was a
main effect of anchor, such that judgments were larger with high, rather than low, anchors ($B = 0.39, SE = 0.04$), $t(161) = 8.93, p < 0.01$. Somewhat surprisingly, there was no Openness × Anchor interaction ($B = 0.10, SE = 0.08$), $t(158) = 1.29, ns$, which is inconsistent with previous research (McElroy & Dowd, 2007). Critically, however, the predicted three-way interaction between anchor condition, openness to experience, and openness to experience certainty ($B = 0.36, SE = 0.13$), $t(157) = 2.84, p < 0.01$, emerged. No other main effects or interactions were significant ($t$’s < 1.5).

The three-way interaction was decomposed at one standard deviation above and below the mean of certainty. Supporting the hypothesis, the interaction of openness and the anchor condition was significant among people high ($B = 0.31, SE = 0.11$), $t(157) = 2.91, p < 0.01$, but not low in certainty ($B = −0.23, SE = 0.14$), $t(157) = −1.63, ns$.

Alternative moderators of anchoring. Next, the moderators used in past research were examined. First, it is noteworthy that only a few of the moderators were significantly correlated with certainty, and generally only to a moderate degree (see Table 2). Most of the moderator variables did not influence the anchoring index at all, and the Certainty × Anchoring Condition × Openness to Experience interaction generally remained significant when controlling for each of the alternative moderators and their interactions. Specifically, none of the reaction time measures, inter-item variability of responses to the openness inventory, extremity of responses, the self-reported situational variability item, or the self-reported public observability item showed any significant main effects or interactions (all $t$’s < 1.5). In addition, the predicted three-way interaction
between certainty, openness, and anchor condition remained significant when controlling for each of these potential moderators and their interactions \( (p < 0.05) \).

The only two variables that did influence the anchoring index were perceived importance and the behavioral consistency question. The anchoring index was submitted to an Anchor Condition × Openness to Experience × Openness to Experience Importance regression analysis. There was a strong main effect of condition \( (B = 0.39, SE = 0.04), t(161) = 9.01, p < 0.01 \), and a marginally significant interaction of openness, importance, and condition \( (B = 0.20, SE = 0.11), t(157) = 1.92, p = 0.06 \). When the 3-way interaction was decomposed one standard deviation above and below the mean of importance, the interaction of openness and anchoring condition was significant among those who reported that the responses they gave to the inventory were personally important \( (B = 0.22, SE = 0.11), t(157) = 2.07, p = 0.04 \), but not among those who did not report that their responses were important to them \( (B = -0.09, SE = 0.12), t(157) = -0.75, ns \). When both certainty and importance were included in the same model, the three way interaction including importance \( (B = 0.18, SE = 0.11), t(153) = 1.62, p = 0.11 \), and the three way interaction including certainty \( (B = 0.24, SE = 0.14), t(153) = 1.73, p = 0.09 \), were similar in their level of significance.

Parallel analyses were conducted using behavioral consistency (i.e., the item referring to consistency between behavior and responses to the inventory). There was a main effect of condition \( (B = 0.39, SE = 0.04), t(161) = 8.87, p < 0.01 \), and a three-way interaction between stability, openness, and condition \( (B = 0.22, SE = 0.10), t(157) = 2.27, p = 0.03 \). Decomposition of the 3-way interaction showed that the interaction of
openness and anchor condition was only significant among those reporting a high degree of behavioral consistency ($B = 0.28, SE = 0.11$), $t(157) = 2.49, p = 0.01$, and not for those reporting lower consistency ($B = -0.10, SE = 0.12$), $t(157) = -0.82, ns$. Additionally, when both stability and certainty were included in the same model, the three-way interaction including certainty remained significant ($B = 0.27, SE = 0.14$), $t(153) = 2.01$, $p = 0.05$, but the three-way interaction including behavioral consistency did not ($B = 0.16, SE = 0.10$), $t(153) = 1.59, p = 0.11$.

Some researchers have found that moderators can be additive, working better together than any single moderator (e.g., Zuckerman et al., 1988). All of the non-certainty moderators (i.e., importance, behavior consistency, perceived stability, public observability, reaction time (reverse-scored so higher values meant faster reaction time), extremity, and interitem variability; $\alpha = 0.45$) were standardized and combined into a single index and parallel analyses to those above were conducted (see Jarvis, MacKenzie, & Podsakoff, 2003, for further rationale for combining multiple measures into a single index). The three-way interaction between openness, condition, and moderator index was nearly significant ($B = 0.37, SE = 0.19$), $t(157) = 1.93, p = 0.06$. When the moderator index and certainty were included in the same model, the three-way including certainty ($B = 0.27, SE = 0.14$), $t(153) = 1.88, p = 0.06$ was marginally significant, but the three-way including the moderator index ($B = 0.26, SE = 0.21$), $t(153) = 1.23, p = 0.22$, dropped to nonsignificance.9

One could argue that the above analysis is not a strong test for certainty, as most of these variables in the index did not moderate the effects in this study. So, as was done
in Study 3, an index of only the successful moderators (i.e., importance and consistency) was compared to certainty. First, there was a significant three-way interaction between openness, condition, and the importance-consistency index ($B = 0.25, SE = 0.10$), $t(157) = 2.45, p = 0.02$. When the importance-consistency index and certainty were included in the same model, the three-way including the index was marginally significant ($B = 0.20, SE = 0.11$), $t(153) = 1.83, p = 0.07$, but the three-way including certainty was not significant ($B = 0.22, SE = 0.14$), $t(153) = 1.57, p = 0.12$.

**Discussion**

In Study 4, the same pattern of results emerged as in the previous studies: when people report a high degree of certainty in their answers to a personality inventory, that inventory is more consequential (i.e., predictive of behavior) than when people are less certain in their answers. In the current study, openness to experience was associated with greater influence of external anchors on judgments, but only for people highly certain in their responses to the openness to experience inventory. Importantly, the role of certainty held when controlling for other known moderators, both singly and combined into an omnibus index. Furthermore, certainty moderated in this study even though the behavior (anchoring) was not obviously related to the personality construct (openness), attenuating concerns about the operation of demand characteristics.

Surprisingly, there was limited success for the alternative moderators in this research. Most of the predicted effects of these moderators were non-significant. This might be in part because the dependent variable in this study was not self-peer correspondence in personality ratings as it has been in many other studies of moderation.
For example, the public observability item may work particularly well as a moderator for dependent variables that involve ratings of behavior by others. A bigger obstacle for the other moderators may have been the non-transparency of the openness scale to participants. Whereas previous research utilized more easily self-perceivable variables, like trait ratings (e.g., Cheek, 1982; Zuckerman et al., 1988), the measure of openness used here involved several seemingly unrelated items, like the importance of art and tolerance of abstract ideas. Thus, the nature of the scale we used may have made some of the moderators difficult for people to answer. For example, given the diversity of items on the scale, it may have been difficult for participants to form an impression of whether their behavior is generally stable or consistent with regards to the scale. This difficulty suggests that one reason that certainty might be potentially useful is that it is relatively easy to assess the level confidence with which one answered questions, irrespective of what those questions actually are.

Despite the potential difficulty that participants might have had in answering the moderator questions, an aggregate index of moderators successfully predicted personality-behavior relations, which is consistent with research showing stronger effects of a personality variable among participants who score high in several moderators (Zuckerman et al., 1988). Importantly, even when controlling for this index, certainty still helped predict personality-relevant behavior. Only importance and behavioral consistency seemed to be as potentially useful as certainty, but when controlling for the effects of all of the other moderators as an index or individually (see Footnote 9), importance did not remain significant in either case; consistency did not remain
significant when controlling for the index and remained (marginally) significant when controlling for the other moderators individually. Certainty, however, remained significant when controlling for the effects of the other moderators combined into an index and marginally significant when controlling for the other moderators individually. When the three successful moderators (i.e., certainty, importance, and consistency) were each compared to an index of the other two, not one remained significant, although both certainty and importance reduced the effects of the importance-consistency index and the certainty-consistency index, respectively (see Footnote 10). Taken together, the results suggest that certainty may be more useful than either importance or behavioral consistency.
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<td>−.03</td>
<td>−.12</td>
<td>−.14</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>8. OE Extremity</td>
<td>.82**</td>
<td>.18*</td>
<td>.18*</td>
<td>−.07</td>
<td>.18*</td>
<td>.18*</td>
<td>−.09</td>
<td>--</td>
</tr>
<tr>
<td>9. OE Interitem variability</td>
<td>−.22**</td>
<td>−.01</td>
<td>.03</td>
<td>−.02</td>
<td>.06</td>
<td>.06</td>
<td>.06</td>
<td>−.36**</td>
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*p < .05. **p < .01.

Table 2. Correlations among variables in Study 4
Chapter 6: General Discussion

In four studies, assessing people’s certainty in their responses to standard personality inventories was shown to help identify whether responses to the personality inventory would be stable over time and predictive of personality-relevant behavior. In Study 1, there was greater correspondence between measurements of need for cognition one week apart when the answers to the first measurement were held with greater certainty. In Study 2, self-monitoring predicted behavior better among those who were certain in their answers to the inventory. In Study 3, participants’ attitudes towards political policy issues were better predicted by their identification as liberal or conservative when they were certain of this ideological identification. In addition, certainty predicted behavior as well as a number of prior ideology moderators. Political interest and political knowledge moderated the effect of ideology on attitudes to a similar extent as certainty, although certainty predicted over and above an index created of the other three moderators. Finally, in Study 4, participants’ behavior was again better predicted by the personality inventory (openness to experience) when certainty in responses was high. More impressively, certainty predicted as well as or better than other previously measured moderators both singly and when combined into an overall index of personality strength. Thus, a combination of other moderators can work as well as
Consistent effects were found across a variety of individual differences, personality variables and behavioral outcomes. Although the strength of the results varied a bit from study to study (e.g., marginal in some but highly significant in others), the overall pattern is quite consistent with the idea that certainty is a useful moderator of the effects of personality inventories. Certainty moderated for single item constructs such as the measure of ideology identification and even for longer and presumably more reliable personality inventories such as the 18-item self-monitoring inventory. The response scales that participants used varied as well, including rating agreement with statements on five-point scales (e.g., openness to experience), true or false response options (e.g., self-monitoring), and single bipolar trait ratings (e.g., ideology). Certainty increased the correspondence between these responses and relevant behaviors irrespective of the exact nature of the inventory. Prior research had suggested that certainty could be useful in moderating effects of bi-polar specific trait ratings (e.g., see Swann & Ely, 1984), but as noted earlier, it was possible that with longer inventories, the enhanced reliability of the inventory itself would render certainty less useful. The current research clearly shows that this is not the case and that certainty is a potentially important addition to research using a wide variety of personality inventories.

In addition, the current results conceptually replicate in situations in which self-schemas could inform both behavior and responses to the scales (e.g., ideology and conservative attitudes), as well as in situations in which self-schemas are less likely to
exist (e.g., self-monitoring) or situations in which self-schemas are irrelevant even if they
do exist, because participants are unlikely to have naïve theories about how the
personality inventory and behaviors relate (e.g., openness to experience and anchoring).
Thus, certainty does not depend upon participants having formed self-schemas (Markus,
1977). We found significant moderation on a variety of outcomes as well, such as
stability (Study 1), self-perceptions of behavior (Study 2), attitudes (Study 3), and
judgmental biases (Study 4). Accordingly, certainty is likely to increase the predictive
validity of a variety of individual difference inventories in a variety of situations and
cannot be dismissed as only being applicable to a narrow set of circumstances.

One issue that cannot be addressed with the studies included here is whether or
not certainty is specific to the scale. That is, it could be the case that certainty as
measured here is indicative of a general form of certainty or self-confidence, rather than
certainty in responses to the inventories per se. This is an important issue because if
participants’ certainty in their responses to a specific inventory is simply reflective of a
general form of certainty, then this approach might not provide any additional benefit
beyond past research examining individual differences in personality prediction (e.g., on
self-consciousness; see Cheek, 1982; Scheier, Buss, & Buss, 1978). While these studies
cannot speak to this issue, research conducted by the author with several collaborators
shows that certainty is specific to the scale (Shoots-Reinhard, DeMarree, Rucker, &
Petty, 2011). Specifically, in that research, two personality inventories -- need to evaluate
(Jarvis & Petty, 1996) and political ideology (see Study 3) -- were used with two
behavioral outcomes (i.e., number of no opinion responses and conservative policy
attitudes). The level of certainty in one inventory did not moderate the effect of the other inventory on the related behavior. For example, certainty in participants’ need to evaluate moderated the effect of need to evaluate on the number of no opinion responses reported, but did not moderate the effect of ideology on policy attitudes. And, certainty in ideology moderated the impact of ideology on policy positions but not the number of no opinion responses. Thus, certainty is specific to the scale and does not simply reflect general self-confidence on the part of the participants.

Because all of the research on personality certainty has examined measured variables, it is correlational in design. Although one might raise concerns about reverse causality (i.e., that instead of certainty creating more stability or more relevant behavior, stability and relevant behavior lead people to infer certainty), a reverse causal interpretation is most plausible when the measure of certainty follows the key dependent variable and when the relationship among the variables is obvious. In these studies, certainty moderated outcomes whether measured before or after the key dependent measure. For example, in Study 1, certainty measured one week before the criterion was useful as a moderator (of stability in need for cognition). It is not clear how certainty measured one week before the criterion variable could be an effect rather than a cause of that outcome. In Study 4, in addition to measuring certainty before the key outcome variable (i.e., anchoring), materials were selected that would make it virtually impossible for participants to notice and act on a link between the predictor and criterion variables. Specifically, it is unlikely that participants would perceive a link between the openness to experience inventory and anchoring, let alone adjust the amount of anchoring to be
consistent with the openness inventory. As a result, the most reasonable conclusion is that certainty in a personality variable at time one plays a core role in determining how useful that personality variable is at a subsequent point in time.

One open issue concerns certainty as an omnibus variable (i.e., an indicator of a wide variety of other strength variables). As mentioned in the introduction, in the attitudes literature, certainty has been associated with actual accessibility (e.g., Holland et al., 2003; Petrocelli et al., 2007), perceptions of accessibility or ease (e.g., Haddock et al., 1999), and actual as well as perceived elaboration (e.g., Barden & Petty, 2007). In the research here as well as in the attitudes literature, certainty was related to a number of other moderators.

However, the effects of certainty generally remained while controlling for the other moderators, whereas one might expect that if certainty were an omnibus variable per se, the certainty moderation would fall to nonsignificance once all of the other moderators were included in the same model. One possible explanation for this finding is that the list of measured moderators was not exhaustive. Certainty would only fall to nonsignificance if all or most of the variables influencing it were measured and included in the same model, and although an attempt was made in Study 4 to measure most of the potential moderators, it is likely that some were missed (e.g., how easy it was for participants to fill out the scale).

In this regard, it is important to note that certainty can be based on a number of factors, and the factors considered might vary across people, personality traits, and situations. For example, in one situation, people might infer the certainty in their
personality variables based on the importance of the inventory to their self-concept, whereas in a different situation or for a different variable, people may base their certainty on the ease with which they responded to the scale items. People could even use several considerations for their certainty judgments. Thus, it may be an impossible task to ever measure exhaustively all of the factors that people consider when making their judgments of certainty.

However, even if not every possible moderator was measured, one might expect certainty to mediate the effects of at least some of the other moderators. However, in analyses in which certainty was tested as a mediator of each of the other moderators, certainty did not mediate these effects.\textsuperscript{11} Because certainty potentially relates to so many other variables, perhaps it is not a strong mediator of any single variable. Thus, overall, although these data provide good evidence for the usefulness of certainty as a moderator personality effects, there is less evidence for the role of certainty as an omnibus mediator or moderator of the impact of other personality strength variables. However, even if certainty is independent of other moderators rather than an omnibus variable, it is still likely to be important. In the data reported here, certainty predicted behavior above and beyond the other moderators.

If certainty is not an omnibus variable, though, it is less clear what about certainty makes it so useful. One important reason for the usefulness of certainty is that even if certainty is not a true omnibus variable, it is still a metacognitive judgment of validity, and as such, it is likely to be based upon participants’ experience completing the scale (e.g., ease, accessibility) and their impressions of the basis for their answers (e.g.,
knowledge, elaboration, behavioral consistency/stability). Another reason may be that it is easy for participants to answer compared to some other moderators and is likely to be applicable irrespective of the scale or the dependent variable, unlike public observability, for example (e.g., in Study 4). Additionally, certainty is related to stability, as was shown in Study 1. A personality variable is more likely to predict behavior if it is stable, so the relationship between certainty and stability might be sufficient to increase the predictive validity of a personality scale. So, certainty might be useful in part because it is related to stability, whereas perhaps some of the other moderators are not. This argument makes it especially surprising that perceived stability was not a moderator in Study 4, but perhaps it is hard for participants to make a judgment about their own stability for less obvious personality scales and participants were using different bases for their certainty in that study.

A further possibility is that certainty reflects the extent to which a person has “figured out” the scale (i.e., determined what underlying construct it measures) or elaborated on the items. Previous research has shown that as people fill out a personality scale, their answers become more polarized, less variable, and correlate better with the rest of the scale (e.g., Knowles, 1988). Because certainty is measured directly after participants finish the scale, participants might be considering how confident they are in their perceptions of what the scale measures or how confident they are in their self-schemas. Data from Study 1 can speak to this issue more directly, because the NFC items were randomized, but certainty was measured after every third NFC item. If certainty increases as people become more aware of what the scale is measuring or as
each additional item forces them to elaborate further on their self-schemas, one would expect certainty would increase as well. Instead, in Study 1, certainty remained much the same from the first measurement ($M = 4.14, SD = 0.81$) to the last measurement ($M = 4.38, SD = 0.75$), with the means only ranging from 4.14 to 4.47. One potential explanation for this finding is that people were relatively certain to begin with, as the high endpoint was 5. It seems likely that if this procedure were utilized for a construct people were less certain of to begin with, certainty would increase over time, although the differences in overall certainty should still be meaningful.

**Conclusion**

In summary, across four studies, it has been shown that people’s certainty in their answers to personality inventories is consequential. Certainty was shown to moderate the stability of the inventories and the extent to which those inventories predicted personality-relevant behavior. Moreover, the effects of certainty generally held when controlling for other previously examined moderators of the personality-behavior relationship. The use of certainty as a personality moderator is advocated for several reasons. First, the general superiority of certainty over the other moderators in the final two studies suggests that certainty is a particularly useful moderator. Second, certainty quite probably has a number of meaningful antecedents which allows researchers to measure a single moderator rather than several. Finally, certainty might be a particularly easy variable for researchers to measure, as it is easy for participants to interpret and only requires a small number of additional items.
References


Hayes, A. F. (2012). An analytical primer and computational tool for observed variable mediation, moderation, and conditional process modeling. The Ohio State University. Columbus, OH.


Appendix A: Materials for Study 1
Need for cognition scale (also used in second session) with certainty items (Cacioppo et al., 1984)
ENJOYMENT OF THOUGHT INVENTORY
We are interested in how the next set of statements describes you. Please rate how characteristic each statement is of you by entering the number from the corresponding scale that best represents your answer.

Scale:
1 extremely uncharacteristic
2 somewhat uncharacteristic
3 uncertain
4 somewhat characteristic
5 extremely characteristic

Items:
I prefer complex to simple problems.
I like to have the responsibility of handling a situation that requires a lot of thinking.
Thinking is not my idea of fun.
I would rather do something that requires little thought than something that is sure to challenge my abilities.
I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
I find satisfaction in deliberating hard for long hours.
I only think as hard as I have to.
I prefer to think about small daily projects rather than long-term ones.
I like tasks that require little thought once I've learned them.
The idea of relying on thought to make my way to the top appeals to me.
I really enjoy a task that involves coming up with new solutions to problems.
Learning new ways to think doesn't excite me much.
I prefer my life to be filled with problems that I must solve.
The notion of thinking abstractly is appealing to me.
I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.
It's enough for me that something gets the job done; I don't care how or why it works.
I usually end up deliberating about issues even when they do not affect me personally.

These items are administered in random order. Every 3 items, participants will be asked the following question:
How certain are you in the responses you just gave to the enjoyment of thought inventory?
   Extremely uncertain
   Somewhat uncertain
   Neither uncertain nor certain
   Somewhat certain
   Extremely certain
Appendix B: Materials for Study 2

Ad-writing task (from Shavitt et al., 1992)

1. In the box below, write the text of your ad and provide a description of any images you might use. We are not concerned with spelling, grammar, or the creativity of your ad. Rather, we simply want to know what approach you consider the most persuasive. Start by writing a headline for the ad, then the copy.

2. Please use the following scale to indicate the theme of your ad. It can range from completely social (focusing on the image associated with the product, such as its popularity) to completely utilitarian (dealing completely with the quality of the product).

   completely social        1----2----3----4----5----6----7       completely utilitarian

Self-monitoring scale (Snyder & Gangestad, 1986)

Instructions: Please indicate if you agree (T) or disagree (F) with the following statements by entering either T or F on the line next to the corresponding statement.

1. I find it hard to imitate the behavior of other people.
2. At parties and social gatherings, I do not attempt to do or say things that others will like.
3. I can only argue for ideas which I already believe.
4. I can make impromptu speeches even on topics about which I have almost no information.
5. I guess I put on a show to impress or entertain people.
6. I would probably make a good actor.
7. In a group of people, I am rarely the center of attention.
8. In different situations and with different people, I often act like a very different person.
9. I am not particularly good at making other people like me.
10. I’m not always the person I appear to be.
11. I would not change my opinions (or the way I do things) in order to please someone else or win their favor.
12. I have considered being an entertainer.
13. I have never been good at games like charades or improvisational acting.
14. I have trouble changing my behavior to suit different people and different situations.
15. At a party, I let others keep the jokes and the stories going.
16. I feel a bit awkward in company and do not show up quite so well as I should.
17. I can look anyone in the eye and tell a lie with a straight face (if for a right end).
18. I may deceive people by being friendly when I really dislike them.

Self-monitoring certainty questions
1. I am confident in the responses I gave to the items in Part I:
   Not at all confident 1------2-------3------4------5 Extremely Confident
2. I am certain the answers I gave in Part I correctly describe me:
   Not at all certain 1------2-------3------4------5 Extremely Certain
3. I am confident the answers I gave in Part I are accurate:
   Not at all confident 1------2-------3------4------5 Extremely Confident
Appendix C: Materials for Study 3

Ideological identification (e.g., Jost, 2006; Jost et al., 2003)

Please rate your political views using the following scale:
- Very liberal
- Slightly liberal
- Moderate
- Slightly conservative
- Very conservative

Ideology certainty

How certain are you in the responses you just gave to the personality inventory?
- Extremely uncertain
- Somewhat uncertain
- Neither uncertain nor certain
- Somewhat certain
- Extremely certain

How confident are you in the responses you just gave to the personality inventory?
- Extremely unconfident
- Somewhat unconfident
- Neither unconfident nor confident
- Somewhat confident
- Extremely confident

Ideological moderators

Political interest (see Judd et al., 1981)

How interested are you in the current presidential election campaign?
- Extremely disinterested
- Somewhat disinterested
- Slightly disinterested
- Slightly interested
- Somewhat interested
- Extremely interested

Have you been watching the current presidential debates? If so, how much?
- No, never have
- No, haven’t watched myself, but have been following them
- Yes, watched one or two
- Yes, watched most of them
- Yes, watched all of them

Do you think about the upcoming presidential election? If so, how often?
- No, never do
- Yes, once or twice in my life
- Yes, once or twice per year
- Yes, once or twice a month
- Yes, once or twice a week
- Yes, every day
- Yes, multiple times per day

Do you watch news programs for political news? If so, how often?
- No, never do
- Yes, once or twice per year
Do you read newspapers (or online news reports) for political news? If so, how often?
   No, never do
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day
   Yes, multiple times per day

Political involvement (see Judd et al., 1981)
Have you ever tried to persuade someone to come to your political orientation? If so, how often?
   No, never have
   Yes, once or twice in my life
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day

Have you ever signed a petition? If so, how many?
   No, never have
   Yes, once or twice in my life
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day

Have you ever contacted a newspaper or a government official about a political issue? If so, how often?
   No, never have
   Yes, once or twice in my life
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day

Do you ever email or share (e.g., on facebook) articles or news about political issues? If so, how often?
   No, never have
   Yes, once or twice in my life
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day
   Yes, multiple times per day

Do you ever comment on articles or news about political issues (e.g., on websites or social network sites like facebook)? If so, how often?
   No, never have
   Yes, once or twice in my life
   Yes, once or twice per year
   Yes, once or twice a month
   Yes, once or twice a week
   Yes, every day
   Yes, multiple times per day

Political knowledge (see Judd et al., 1981)
Perceived knowledge
How knowledgeable would you say you are about politics?
   Not at all knowledgeable
   Slightly knowledgeable
Actual knowledge
1. Who is the current President of the United States?
2. What party does he or she belong to?
3. Name as many potential challengers as you can (these can be people who considered running and have since withdrawn).
4. Who is the Vice President?
5. Who is Speaker of the House?
6. Who is the Secretary of State?
7. Who is the Secretary of the Treasury?
8. Name as many other members of the Presidential Cabinet as you can (mention their position if possible).
9. Name as many current Supreme Court Justices as you can.
10. Who are the current US Senators representing Ohio (and name their parties if you can)?
11. Name as many other US senators as you can, including their parties.
12. Who are the current US House Representatives for Ohio (and name their parties if you can)?
13. Name as many other US Representatives as you can, including their parties.
14. Who is the current Ohio governor?
15. What party does he or she belong to?

Policy items (from ANES; most conservative response underlined)
Do you think that the United States should increase, decrease, or keep welfare spending the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on Fighting the disease AIDS be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on Food Stamps be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on Public Schools be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on Child Care be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on Programs that Assist Blacks be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending
   No opinion
Should federal spending on The Space Program be increased, decreased, or kept about the same?
   Should increase spending
   Should keep spending the same
   Should decrease spending

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No opinion

Should federal spending on Defense be increased, decreased, or kept about the same?
- Should increase spending
- Should keep spending the same
- Should decrease spending
- No opinion

If the United States saves a lot of money on defense spending in the next few years, what should most of that money be used for—to reduce the federal budget deficit, to cut taxes, or to increase spending on domestic programs?
- Reduce deficit
- Cut taxes
- Increase spending
- No opinion

Do you favor or oppose the death penalty for persons convicted of murder?
- Strongly favor
- Favor
- Oppose
- Strongly oppose
- No opinion

Which of the following views comes closest to your opinion on the issue of school prayer?
- By law,祈祷 should not be allowed in public schools
- The law should allow public schools to schedule time when children can pray silently if they want to
- The law should allow public schools to schedule time when children, as a group, can say a general prayer not tied to a particular religious faith
- By law, public schools should schedule a time when all children would say a chosen Christian prayer
- No opinion

Should burning or destroying the American flag as a form of political protest be legal or should it be against the law?
- Should be legal
- Should be against the law
- No opinion

There has been some discussion about abortion during recent years. Which one of the opinions below best agrees with your view?
- By law, abortion should never be permitted
- The law should permit abortion only in cases of rape, incest, or when the mother’s life is endangered by the fetus
- The law should permit abortion only when the need for abortion is clearly established (including, but not limited to, rape, incest, or to protect the mother’s life)
- By law, a woman should always be able to obtain an abortion as a matter of personal choice
- No opinion

Do you support or oppose the North American Free Trade Agreement (NAFTA)?
- Strongly favor
- Favor
- Oppose
- Strongly oppose
- No opinion

Do you favor or oppose US compliance with the Kyoto Protocol, which is designed to reduce greenhouse gas emissions?
- Strongly favor compliance
- Favor compliance
- Oppose compliance
- Strongly oppose compliance
- No opinion

Should the government force all companies to comply with strict pollution standards even if it might put some of them out of business?
- Definitely it should
- Maybe it should
- Maybe it shouldn’t
- Definitely it shouldn’t
- No opinion

Some people feel the government in Washington should see to it that every person has a job and a good standard of living. Others think the government should just let each person get ahead on his or her own. What do you think?
Definitely government should see to a job and a good standard of living for everyone
Maybe government should see to a job and a good standard of living for everyone
Maybe government should let each person get ahead on his or her own
Definitely government should let each person get ahead on his or her own

No opinion

There is much concern about the rapid rise in medical and hospital costs. Some people feel there should be a government insurance plan which would cover all medical and hospital expenses for everyone. Others feel that all medical expenses should be paid by individuals, and through private insurance plans like Blue Cross or other company paid plans. What do you think?

- Definitely medical expenses should be covered by government
- Maybe medical expenses should be covered by government
- Maybe medical expenses should be paid by individuals and private insurance
- Definitely medical expenses should be paid by individuals and private insurance

No opinion

Some people say that it is better for America if different racial and ethnic groups maintain their distinct cultures. Others say that it is better if groups change so that they blend into the larger society as in the idea of a melting pot. Which of these positions comes closer to your own opinion: Racial and ethnic groups should maintain their distinct cultures, or groups should change so that they blend into the larger society?

- Definitely groups should maintain their cultures
- Maybe groups should maintain their cultures
- Maybe groups should change and blend
- Definitely groups should change and blend

No opinion

We should be more tolerant of people who choose to live according to their own moral standards, even if they are very different from our own.

- Agree strongly
- Agree
- Disagree
- Disagree strongly

No opinion

Do you think that we have gone too far, not far enough, or just far enough in pushing for equal rights in this country?

- We’ve gone too far
- We’ve gone just far enough
- We haven’t gone far enough

No opinion

Do you think that enough is being done to protect women from being sexually harassed in the workplace, is too much being done or too little being done?

- Too much
- Enough
- Too little

No opinion

Do you favor or oppose laws to protect women against job discrimination?

- Strongly favor
- Favor
- Oppose
- Strongly oppose

No opinion

Do you favor or oppose affirmative action (i.e., laws or policies that give an advantage to a minority job or school candidate over a majority person when the two are otherwise equally qualified)?

- Strongly favor
- Favor
- Oppose
- Strongly oppose

No opinion

Do you favor or oppose laws to protect racial minorities against job discrimination?

- Strongly favor
- Favor
- Oppose
- Strongly oppose

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Do you favor or oppose laws to protect homosexuals against job discrimination?
- Strongly favor
- Favor
- Oppose
- Strongly oppose
- No opinion

Do you think homosexuals should be allowed to serve in the United States Armed Forces or don't you think so?
- Homosexuals should be banned
- Homosexuals should be allowed to serve
- No opinion

Do you think gay or lesbian couples, in other words, homosexual couples, should be legally permitted to adopt children?
- Should be allowed to adopt
- Should be banned from adopting
- No opinion

Should marriage between same-sex persons (i.e., gay marriage) be legal or should it be against the law?
- Should be legal
- Should be against the law
- No opinion
Appendix D: Materials for Study 4

Openness to experience scale (Goldberg et al., 2006)
Please use the following scale to indicate how much each statement describes you.

1 Not at all
2 Very little
3 Somewhat
4 Moderately
5 Very much

Items:
I believe in the importance of art.
I have a vivid imagination.
I tend to vote for liberal political candidates.
I carry the conversation to a higher level.
I enjoy hearing new ideas.
I am not interested in abstract ideas. (r)
I do not like art. (r)
I avoid philosophical discussions. (r)
I do not enjoy going to art museums. (r)
I tend to vote for conservative political candidates. (r)

Personality moderators

Certainty
1. How certain are you in the responses you just gave to the personality inventory?
   Extremely uncertain
   Somewhat uncertain
   Neither uncertain nor certain
   Somewhat certain
   Extremely certain

2. How confident are you in the responses you just gave to the personality inventory?
   Extremely unconfident
   Somewhat unconfident
   Neither unconfident nor confident
   Somewhat confident
   Extremely confident

Importance (e.g., Cheek, 1982; Zuckerman et al., 1988)
3. How important are the responses you just gave to the personality inventory to you?
   Extremely unimportant
   Somewhat unimportant
   Neither unimportant nor important
   Somewhat important
   Extremely important

4. How relevant are the responses you just gave to the personality inventory to you?
   Extremely irrelevant
   Somewhat irrelevant
   Neither irrelevant nor relevant
   Somewhat relevant
   Extremely relevant

Perceived stability (e.g., Cheek, 1982; Zuckerman et al., 1988)
5. How much do you vary from situation to situation in the responses you just gave to the personality inventory?
   Not at all varying
   Slightly varying
   Somewhat varying
   Moderately varying
   Extremely varying

Perceived behavioral consistency
6. How consistent would you say your behavior is with the responses you just gave to the personality inventory?
   Not at all consistent
   Slightly consistent
   Somewhat consistent
   Moderately consistent
   Extremely consistent

Public observability (e.g., Cheek, 1982; Zuckerman et al., 1988)
7. How publicly observable would you say your behavior is with regards to the responses you just gave to the personality inventory?
   Not at all observable
   Slightly observable
   Somewhat observable
   Moderately observable
   Extremely observable

Anchoring task (first two are from Jacowitz & Kahneman, 1995; second is from McElroy & Dowd, 2007)
1. Is the height of Mt. Everest more or less than [2,000/45,000] feet?
   More
   Less
   What is the exact height of Mt. Everest in feet?

2. Is the height of the tallest redwood tree more or less than [65/550] feet?
   More
   Less
   What is the exact height of the tallest redwood tree in feet?

3. Is the percentage of African nations in the UN more or less than [85/25] %?
   More
   Less
   What is the exact percentage of African nations in the UN?
There was a marginal tendency for those high in NFC certainty to return to the lab in greater numbers than those low in NFC certainty ($B = .50$, $SE = .28$) $Wald = 3.16$, $p = .08$.

An alternative way to examine stability is to split T1 certainty at its median and compare correlations between T1 and T2 NFC for each group. Although median splits are generally discouraged (see McCallum, 2002), there is no simple way to test correlations without them in these data. Consistent with the regression, the correlation was higher for high certainty ($r = 0.92$) than for low certainty participants ($r = 0.74$). Using Fisher’s $r$-to-$z$ transformation (Cohen & Cohen, 1983; Preacher, 2002), this difference was significant, $z = -2.49$, $p = 0.01$. Regression analyses were also conducted for each group. The effect of T1 NFC on T2 NFC was stronger for the high certainty participants ($B = 0.98$, $SD = 0.07$), $t (33) = 13.88$, $p > 0.01$, than for the low certainty participants ($B = 0.84$, $SD = 0.15$), $t (27) = 5.78$, $p > 0.01$.

Another alternative analysis would be to compute a change index by taking the absolute value of the difference between T1 and T2 NFC. This index was computed, but did not correlate with T1 certainty ($r = -0.13$). This could indicate that certainty is predictive of relative stability, or participants’ position in a sample distribution, but less predictive of overall mean shifts in the sample distribution which can be influenced by many factors.

Perceived and actual knowledge were also analyzed separately; the results were similar to those found for the index.
The same analysis was performed for the other two successful moderators. That is, interest was compared to an index of certainty and knowledge and knowledge was compared to an index of certainty and interest. There was a main effect of the moderator index of certainty and knowledge on policy attitudes ($B = 2.60$, $SE = 1.28$), $t(146) = 2.03$, $p = 0.04$, such that higher scores on the index were associated with more conservative attitudes. This index also interacted with ideology to predict policy attitudes ($B = 4.95$, $SE = 1.43$), $t(145) = 3.47$, $p < 0.01$. When interest was included in the same model with this index, the interaction of the certainty-knowledge index and ideology remained significant ($B = 4.91$, $SD= 1.67$), $t(143) = 2.94$, $p < 0.01$, whereas the interaction of interest and ideology did not ($B = 0.01$, $SD= 1.22$), $t(143) = 0.01$, ns. A similar pattern emerged for the index of certainty and interest. There was a main effect of the moderator index of certainty and knowledge on policy attitudes ($B = 2.31$, $SE = 1.15$), $t(146) = 2.01$, $p = 0.05$, such that higher scores on the index were associated with more conservative attitudes. There was also an interaction of the certainty-interest index with ideology ($B = 3.44$, $SE = 1.19$), $t(145) = 2.89$, $p < 0.01$. When included in the same model, the interaction involving the certainty-interest index was significant ($B = 2.83$, $SD= 1.42$), $t(143) = 1.99$, $p = 0.05$, but the interaction involving knowledge was marginally significant ($B = 2.07$, $SD= 1.22$), $t(143) = 1.69$, $p = 0.09$.

Another method for comparing moderators would be to include all of them, along with their interactions with ideology in a single model. In this model, two significant interactions emerged: the first with certainty ($B = 2.54$, $SE = 0.89$), $t(139) = 2.85$, $p <
0.01, the second with knowledge \((B = 4.25, SE = 1.60), t(139) = 2.66, p < 0.01\). Neither the interaction with interest nor the interaction with involvement was significant \((t's < 1.5)\).

As cutoffs for response times, 0.5 seconds and 40 seconds were used (e.g., Neubauer & Malle, 1997). Average, standardized (within items and within participants), and log-transformed indices were computed, and a cutoff of ±2 SD (removing or changing ~5.75% of responses) was applied, after which the indices were recalculated. None of these variations influenced the results. No matter how they were analyzed, reaction times did not moderate the effects and in every case, the interaction including certainty remained significant when included in the same model.

A calculation of interitem variability of scores was also calculated for need for cognition in Study 1. Because political ideology was measured using a single item and the self-monitoring inventory uses a dichotomous response scale, an interitem variability score could not be calculated for these variables. Interitem variability did not moderate the effects of need for cognition. However, the interaction including certainty did not remain significant when included in the model with interitem variability \((B = 0.21, SE = 0.14), t(58) = 1.46, p = 0.15\). Nevertheless, interitem variability cannot be considered a better moderator than certainty because it did not moderate any of the effects.

An index of extremity of scores was calculated for each of the other personality variables in Studies 1, 2, and 3 and the dependent measures in those studies was
submitted to personality × extremity regression analyses. Extremity did not ever moderate a single effect or reduce the interaction with certainty.

Participants also completed 2 more familiar anchoring items (e.g., the population of Chicago and the length of the Mississippi river). Consistent with past research suggesting that anchoring is reduced or eliminated as familiarity or knowledge is increased (Wilson et al., 1996), there was no significant anchoring effect (or any other effects) on these items. A hierarchical linear regression analysis was conducted to more formally determine whether the pattern of results differed between familiar and unfamiliar targets. An index of the standardized anchors for the unfamiliar anchored objects was compared to the index for the familiar anchored objects. The object (familiar or unfamiliar) was treated as a within-subjects (Level 1) variable; anchor (high or low), openness to experience, and openness to experience certainty were treated as between-subjects (Level 2) variables. The continuous variables were centered and the dichotomous variables were effects coded. As expected, this analysis revealed a significant four-way interaction, $\gamma = -0.25$, $t(157) = -2.45$, $p = 0.02$, showing that certainty moderated the impact of openness to experience on anchoring for the unfamiliar (as described in the text) but not the familiar items. For the familiar items, no effects were observed. In addition, there was also a main effect of openness certainty, $\gamma = -0.12$, $t(157) = -2.28$, $p = 0.02$, such that greater certainty resulted in lower estimates, a main effect of anchor, $\gamma = 0.23$, $t(157) = 6.63$, $p < 0.01$, such that larger anchors led to larger estimates, and an interaction of anchor and familiarity, $\gamma = -0.14$, $t(157) = -4.03$, $p <$
0.01, such that the anchor had a larger effect for the unfamiliar than the familiar objects. No other effects were significant ($t’s < 2, p < 0.09$).

Similar analyses were conducted with importance and stability. First, an index of all non-importance moderators was created (i.e., certainty, behavior consistency, perceived stability, public observability, reaction time, extremity, and interitem variability) and the moderator index was compared to importance. The 3-way interaction of the moderator index was significant ($B = 0.44, SE = 0.20), t (157) = 2.22, p = 0.03$. When both importance and the moderator index were included in the same model, however, the 3-way interactions including the moderator index ($B = 0.21, SE = 0.24), t(153) = 0.89, p = 0.38$, and importance ($B = 0.16, SE = 0.12), t(153) = 1.30, p = 0.20$, were not significant. A similar pattern of results emerged for analyses involving behavioral consistency. An index was created of all non-consistency moderators. The 3-way interaction of this moderator index was significant ($B = 0.40, SE = 0.19), t (157) = 2.07, p = 0.04$. When included in the same model as behavioral consistency, the 3-way involving the index remained significant ($B = 0.42, SE = 0.20), t(153) = 2.89, p = 0.04$, but the 3-way involving stability did not ($B = -0.06, SE = 0.06), t(153) = -0.93, p = 0.35$. Another way to assess the relative efficacy of the various moderators would be to include all of them, along with their interactions, in the same model, rather than combining them into an index. Although none of the interactions were significant using this approach, several were nearly significant, including the interaction involving certainty ($B = 0.28, SE = 0.16), t (129) = 1.72, p = 0.09$, the interaction involving public observability ($B =
−0.27, SE = 0.15), t (129) = −1.77, p = 0.08, and the interaction involving behavioral consistency (B = 0.32, SE = 0.16), t (129) = 1.93, p = 0.06. The interactions involving importance, perceived stability, accessibility, inter-item variability, and extremity did not predict anchoring (t’s < 1.5).

10 Importance and behavioral consistency were examined in a similar manner: each was compared to an index of the other two successful moderators. First, the interaction of the certainty-consistency index with openness and condition was significant (B = 0.33, SE = 0.11), t(157) = 3.16, p < 0.01. When the certainty-consistency index and importance were included in the same model, the three-way including the index was marginally significant (B = 0.22, SE = 0.12), t(153) = 1.78, p = 0.08, but the three-way including importance was not significant (B = 0.16, SE = 0.12), t(153) = 1.38, p = 0.17. Next, the certainty-importance index was analyzed. The three-way including the certainty-importance index was significant (B = 0.30, SE = 0.11), t(157) = 2.87, p < 0.01. When the certainty-importance index and consistency were included in the same model, the three-way including the index remained significant (B = 0.31, SE = 0.11), t(153) = 2.89, p < 0.01, but the three-way including consistency was not significant (B = −0.02, SE = 0.06), t(153) = −0.30, p = 0.77.

11 These mediational analyses were conducted for Studies 3 and 4 by entering the interaction of the personality variable and certainty as the mediator of the effect of the interaction of the personality variable and the successful moderators on the behavioral outcome, with lower-order effects entered as covariates. For Study 3, mediational
analyses were conducted for political involvement and knowledge; for Study 4, analyses were conducted for importance and behavioral consistency. The data were analyzed using PROCESS (Hayes, 2012). This statistical procedure uses bootstrapping to estimate the indirect effect for mediation. The 95% confidence intervals for each of the indirect effects included 0, thus certainty did not mediate the effects of the other moderators. In Study 4, the Sobel test for the indirect effect of behavioral consistency through certainty was nearly significant, $z = 1.82, p = 0.07$, as was the indirect effect of importance through certainty, $z = 1.60, p = 0.11$. In Study 3, the Sobel’s were not significant ($z$’s $< 1$).